REMARKS

In the Action, claims 1-4 are rejected, and claim 5 is withdrawn from consideration as being directed to the non-elected invention. In response, claim 1 is amended to recite that the monomer liquid supplied to the supply pipe line is continuously in a stirred state by passing the flow of the monomer liquid through a stirring apparatus in the path of the supply pipe line and thereafter joining the polymerization initiator into the stirred monomer liquid to obtain a mixed liquid and supplying the mixed liquid to a polymerization apparatus. Support for this feature is found on page 9, lines 19-21, and in Example 1 on bridging pages 20 and 21 of the specification.

In view of this Amendment and the following comments, reconsideration and allowance are requested.

Rejection of Claims 1-4

Claims 1-4 are rejected under 35 U.S.C. § 103 as being obvious over U.S. Patent No. 3,988,509 to Ballard et al. in view of U.S. Patent No. 6,252,016 to Wu et al. Ballard et al. is cited for disclosing a continuous process for producing copolymers by introducing a free radical initiator into a polymer stream. As noted in the Action, Ballard et al. does not disclose the use of premixing in a supply pipe line where the monomer liquid is continuously supplied to continuously stir the monomer liquid in the supply pipe line. Wu et al. is cited for disclosing a process for producing polymers where the monomer emulsion can be premixed to stabilize the emulsion before being fed to the reactor.

As discussed in the specification, the claimed invention provides improved results that are unexpected by one of ordinary skill in the art. Example 1 bridging pages 20 and 21 of the specification discloses using an apparatus of Figure 3 where a flow of the monomer liquid is

stirred in the supply pipe line by being passed through the stirring apparatus 12 so that the flow of the monomer liquid is in a stirred state while passing through the supply pipe line. The initiator is joined with the stirred flow of the monomer liquid "downstream from the rear of the element, thus preparing a mixed liquid 40". See page 21, lines 5 and 6. The element referred to in this passage refers to the static mixer in the form of a "revolution twisted element" (page 21, line 1). Comparative Examples 1 and 2 were carried out in the same manner without the use of the stirring apparatus 12. The polymerization initiator was added to the flow that had not passed through a stirring apparatus to produce the monomer liquid in a stirred state. In Comparative Examples 1 and 2, a flow of the monomer liquid was joined with the polymerization initiator without pre-stirring the flow of the monomer liquid. Therefore, Comparative Examples 1 and 2 correspond substantially to the process of Ballard et al. and Wu et al.

As shown by the data in Table 1 on page 22 of the specification and as described on page 22, lines 13-28 of the specification, Example 1 provides superior results to the results of Comparative Examples 1 and 2. More specifically, passing the monomer liquid through a stirrer to provide a monomer flow in a stirred state and thereafter introducing the initiator into the stirred flow of the monomer liquid produces a polymer with a lower extractable content and a lower amount of residual monomer compared to the resulting polymer of Comparative Example 1. Furthermore, in Comparative Example 2, clogging with a formed polymer occurred in a short time, so that the operation could not be carried out continuously for a long time. Therefore, the specification shows the unexpected results from stirring the flow of the monomer liquid in the supply flow pipe prior to mixing with the polymerization initiator according to the claimed invention.

Wu et al. does not disclose mixing the initiator with an emulsion or monomer stream prior to feeding the mixture to the reactor. Wu et al. discloses feeding the initiator into the mixing apparatus for forming the stable emulsion prior to delivering to a supply line to the reactor. Therefore, it would not have been obvious to modify the process of Ballard et al. according to Wu et al. as suggested in the Action since Ballard et al. is not concerned with forming an emulsion.

The combination of Ballard et al. and Wu et al. do not suggest the claimed invention of continuously supplying a monomer liquid to a supply pipe line to continuously stir a flow of the monomer liquid in the pipe line by continuously passing the flow of the monomer liquid through a <u>stirring apparatus in the path of the supply pipe line</u> as recited in claim 1. The combination of Ballard et al. and Wu et al. further fails to disclose the polymerization process for continuously stirring a monomer liquid flow in a supply pipeline to put the monomer liquid flow in a continuously stirred state and introducing an initiator into the continuously stirred state of the monomer flow.

Claim 1 specifically recites passing a flow of the monomer liquid through a stirring apparatus in the path of the supply pipe line to produce a continuously stirred monomer liquid flow in the flow pipe line and thereafter introducing the initiator into the continuously stirred monomer liquid flow. Ballard et al. and Wu et al. do not disclose a stirring apparatus in a supply pipe line, a monomer liquid flow continuously stirred while passing through a supply pipe line, or the introduction of an initiator into a continuously stirred monomer liquid flowing through a supply pipe line. Accordingly, claim 1 and the claims depending therefrom are allowable over the art of record.

As noted above, Ballard et al. does not disclose or suggest passing a flow of the monomer liquid through a stirring apparatus to produce a flow of the monomer liquid <u>in the</u>

stirred state. The passages in Ballard et al. referred to in the Action disclose feeding the free radical initiator through a line 10 to form a mixture. As shown in the Figure of Ballard et al., line 4 supplies the initiator downstream of the first separator 7 where the unreacted monomer is removed. Therefore, the initiator supplied by line 4 of Ballard et al. supplies the monomer mixture as in the conventional processes. The passage in column 4, lines 33-42 of Ballard et al. specifically states that the initiator is fed between the first and second separators which are downstream of the reactor, and thus, introduced into the polymer stream after the monomer has been separated from the stream. Thus, process of Ballard et al. has no relation to the claimed invention.

The section referred to in column 4, lines 33-42 of Ballard et al. also does not suggest mixing of the free radical initiator and the monomer. This passage refers to "excellent mixing of the free radical initiator and the solvent streams". This is not the claimed invention. There is no disclosure of "excellent" mixing of a monomer stream with the initiator. Furthermore, this passage expressly discloses that the initiator is mixed with the solvent stream prior to contacting the polymer flowing from the first to the second separator. This has no relation to the claimed invention.

Wu et al. also fails to disclose passing a flow of a monomer liquid through a stirring apparatus in the flow path of the supply pipe line to produce a flow of the monomer liquid in a stirred state and thereafter introducing the polymerization initiator. As noted in the Action, Wu et al. discloses a static mixer or premixer. Thus, the Action recognizes that Wu et al. does not disclose the claimed invention, but contends there is no difference between Wu et al. and the claimed supply pipe line. Wu et al. provides a monomer emulsion that is constantly stirred in a feed tank to stabilize the emulsion prior to mixing with the polymerization initiator.

The Action cites a single dictionary definition of a "vessel (tank)" as a tube that carries liquids. However, this definition is inconsistent with the definition in the *Cambridge* dictionaries cited in the Action. This definition does not refer to a tank in the manner suggested in the Action. The Action paraphrases the dictionary definition to reach the desired meaning. Furthermore, this definition clearly does not define a tank as a tube that carries liquids. The only definition of a vessel from this source of dictionaries that refers to a tube is specifically for carrying body fluids. The single definition cited in the Action specifically refers to a blood vessel as a type of vessel that carries liquids. Moreover, the Action carefully selected a single definition out of the 21 dictionaries cited by the web page. Furthermore, *Webster's Dictionary, Unabridged*, from the same source as that cited in the Action defines a vessel as "a hollow or concave utensil for holding anything". Thus, a vessel is not necessarily a tube that carries liquids and the Action applies a very narrow definition for the term contrary to the intention of Wu et al.

The term vessel as used in Wu et al. is clearly not referring to a blood vessel or other tube for carrying body fluids and is instead referring to a closed vessel such as a tank. Therefore, the vessel and tank as clearly intended by Wu et al. are not the equivalent of a supply pipe line as used in the claimed invention. The Action applies a definition of "vessel" that is not intended by Wu et al.

The feed tank of Wu et al. does not serve to carry the liquid from one place to another in the same manner as a supply pipe line of the claimed invention. The vessel and tank referred to in Wu et al. is clearly a closed space in which the monomer liquid is stirred for a selected period of time to produce the emulsion without exiting the tank. Only after the emulsion is formed from the monomer liquid is the emulsion directed from the feed tank and mixed with the polymerization initiator. Therefore, Wu et al. does not provide a flow of the

monomer liquid in a stirred state while being carried through a supply pipe line from one place to another.

Furthermore, Wu et al. specifically mixes the monomer liquid prior to mixing with the polymerization initiator to stabilize the monomer liquid as an emulsion. See, for example, column 6, lines 46-54 of Wu et al. This is different from the claimed invention which rapidly attains a sufficient and uniform mixing of the monomer liquid with a polymerization initiator by passing a flow of the monomer liquid through a stirring apparatus in the supply pipe line prior to the mixing with the polymerization initiator.

The Action concludes that it would have been obvious to one of ordinary skill in the art to incorporate the teaching of stirring the liquid monomer of Wu et al. into Ballard's monomer feed line. Even if one were to do so, the combination of Wu et al. and Ballard et al. would not result in the claimed invention. Wu et al. provides no suggestion of passing a monomer liquid through a supply pipe line in a stirred state and thereafter introducing a polymerization initiator into the supply pipe line. Furthermore, the feed line of Ballard et al. referred to in the Action is downstream of the reactor and the separator and is not a monomer feed to a reaction apparatus. Therefore, Wu et al. provides no motivation or incentive to modify Ballard et al. according to the claimed invention.

In view of these amendments and the above comments, claim 1 would not have been obvious over the art of record.

Claims 2, 3 and 4 are also allowable as depending from allowable claim 1. Furthermore, the combination of Ballard et al. in view of Wu et al. do not disclose or suggest the features of these claims in combination with the features of claim 1. For example, Ballard et al. and Wu et al. do not disclose the monomer liquid having a concentration of not less than 40 wt% as in claim 2. Ballard et al. is cited for allegedly disclosing a monomer liquid within

the claimed range. However, as noted above, Ballard et al. does not disclose a monomer liquid in the claimed range that is passed through a stirring apparatus to produce a flow of the monomer liquid in a supply flow pipe in a stirred state.

Claim 3 depends from claim 1 and recites that the monomer liquid has a temperature of not lower than 50°C in the supply pipe line. Therefore, claim 3 recites that the monomer liquid while being continuously stirred, has a temperature of not lower than 50°C when the polymerization initiator is introduced to the stirred monomer liquid. Ballard et al. is cited for disclosing a feed stream temperature before feeding to the reactor. However, Ballard et al. does not disclose a continuously stirred monomer liquid in a supply flow pipe at the claimed temperature where the polymerization initiator is fed to the supply pipe line. Accordingly, claim 3 would not have been obvious to one of ordinary skill in the art. Wu et al. and Ballard et al. further fail to disclose introducing a polymerization initiator into a flow pipe line where the monomer liquid has a Reynolds number of not less than 50 as in claim 4.

Ballard et al. discloses the monomer being maintained below the polymerization temperature during the feed process to prevent premature polymerization. The monomer liquid of Ballard et al. in the feed pipe is not within the claimed range. The initiator of Ballard et al. is merged with the monomer prior to feeding to the reactor so that the monomer liquid and initiator are not heated to the desired polymerization temperature until supplied to the reactor.

The monomer flow of Ballard et al. is a conventional process similar to Comparative Examples 1 and 2 in the present specification. As discussed above, this process does not produce the same results as the process according to the claimed invention. The monomer liquid and polymerization initiator are not efficiently mixed in Ballard et al., so that the components must be mixed subsequently by a mixer.

According to the claimed invention, the polymerization initiator is added to the monomer liquid flow continuously stirred while passing through the supply pipe line so that the initiator is combined efficiently and completely with the monomer liquid. The resulting mixture of the polymerization initiator and the monomer liquid do not require subsequent mixing or forced mixing as in conventional processes such as of Ballard et al. and Wu et al. The claimed process enables the monomer liquid to be maintained at a temperature of not lower than 50°C as recited in claim 3 without the disadvantages of the prior process that results in clogging of the apparatus. The polymerization initiator can be mixed with the monomer liquid in a short time with unexpected results as shown in the data of Table 1.

In view of the above, Wu et al. provides no motivation or incentive to one of ordinary skill in the art to modify Ballard et al. as suggested in the Action. Furthermore, even if Ballard et al. were to be modified according to the teachings of Wu et al., the result would not be the claimed invention. Since the art of record does not disclose or suggest the features of the claimed invention, Applicants respectfully submit that the rejection is based on hindsight.

In view of the above, reconsideration and allowance are requested.

Respectfully submitted,

Garrett V. Davis
Reg. No. 32,023

Roylance, Abrams, Berdo & Goodman, L.L.P.
1300 19th Street, N.W., Suite 600
Washington, D.C. 20036-1649
(202) 659-9076

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